

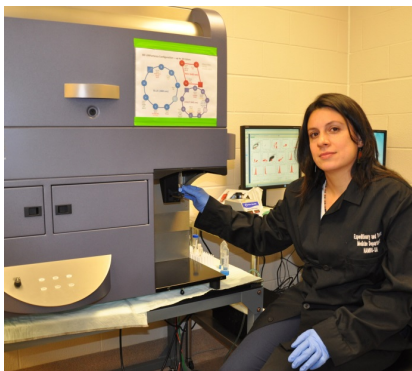


News Releases

Navy Medicine Researchers Focus on Monitoring the Immune System to Diagnose and Treat Traumatic Injuries

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From NAMRU-San Antonio Public Affairs



"Finding solutions to diagnose and treat injuries our warfighters sustain on the battlefield is our ultimate goal," says Dr. R. Madelaine Paredes, researcher in NAMRU-SA's Immunodiagnostic and Bioassay Development Department. Paredes demonstrates the use of the flow cytometer technique to perform single cell measurements. Flow cytometer can identify the numbers of cells that have a particular feature (size, or a specific marker in their surface or intracellular). Navy researchers can then discern what molecules are being produced by each cell type and compile an extensive inflammatory profile for that particular sample. (Photo by Flisa Stevenson, NAMRU-SA Public Affairs)

SAN ANTONIO – Researchers at the Naval Medical Research Unit - San Antonio (NAMRU-SA) are working to understand both the physiologic and molecular changes occurring in response to traumatic injury. One of the primary focus areas of this research is the identification of the mechanisms within the immune system that respond to injury, specifically hemorrhage and poly-trauma. "Traumatic injury is a leading cause of mortality in the military and civilian population. The loss of blood, combined with tissue damage, initiates a physiologic response that can promote both reparative wound healing and deleterious inflammation, depending on the predisposition of the affected individual's immune system," said Dr. Madelaine Paredes, researcher in NAMRU-SA's Immunodiagnostic and Bioassay Development Department.

Humans have widely varying immune systems due to a variety of factors including genetic makeup, gender, age, lifestyle, and previous antigen exposure. Collectively, these factors contribute to an individual's immune system's response to insult. NAMRU-SA researchers employ models closely replicating militarily relevant injuries in order to translate findings from the laboratory into a clinical setting.

"Finding solutions to diagnose and treat the injuries our warfighters sustain on the battlefield is our ultimate goal," said Paredes.

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Immune-Phenotyping, one of the tools used to monitor the status of the immune system under a certain set of conditions, involves uncovering the contributions of different immune cell populations in terms of their occurrence over time, and expression of inflammatory factors.

“We use a sophisticated technique called flow cytometry which allows us to perform exhaustive characterization of the immune response with cellular resolution that only requires a few microliters of a sample,” explained Paredes.

Flow cytometry uses the power of fluidics to pass cells in suspension through a laser beam. Physical properties of cells and particles are captured and converted to quantifiable outputs to measure cell size and granular content. Fluorescently labeled antibodies are employed to tag specific proteins, such as surface receptors or intracellular molecules, permitting a nuanced and in-depth cellular analysis.

Flow cytometry determines the contributions of various white blood cells, such as T-Cells and B-Cells, to the inflammatory milieu in trauma. Researchers can discern what molecules are being produced by each cell type and compile an extensive inflammatory profile for a particular sample.

Immunophenotyping accomplishes three critical goals. First, it uncovers key cells and cell products required for orchestrating immunologic reactions to injury; second, it fosters a more complete understanding of the signaling pathways that become deranged in trauma patients; and lastly, it determines which, if any, of these molecules can be exploited as therapeutic targets or opportunities for clinical intervention.

These studies continue to provide vital knowledge for both research efforts and clinical decision-making within the trauma and critical care fields.

NAMRU-SA's mission is to conduct medical, dental, and biomedical research, which focuses on ways to enhance the health, safety, performance, and operational readiness of Navy and Marine Corps personnel and addresses their emergent medical and dental problems in routine and combat operations.

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